ECE 344 - Microprocessors
Entrance Knowledge Probe
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10 Points

1. What is the minimum number of bits that is needed to represent the unsigned decimal value of 12,375?

    2^13 = 8,192
    2^14 = 16,384

    Therefore, 14 is the minimum number of bits that is needed to represent the unsigned decimal value of 12,375.

2. Fill in the following table showing the equivalent representation of the binary number   10 Points
    01010110.

Two's complement	Decimal	Hexadecimal
10101010	86	56

3. You will use the combinational circuit shown below, as figure 1, to answer the next set of questions.
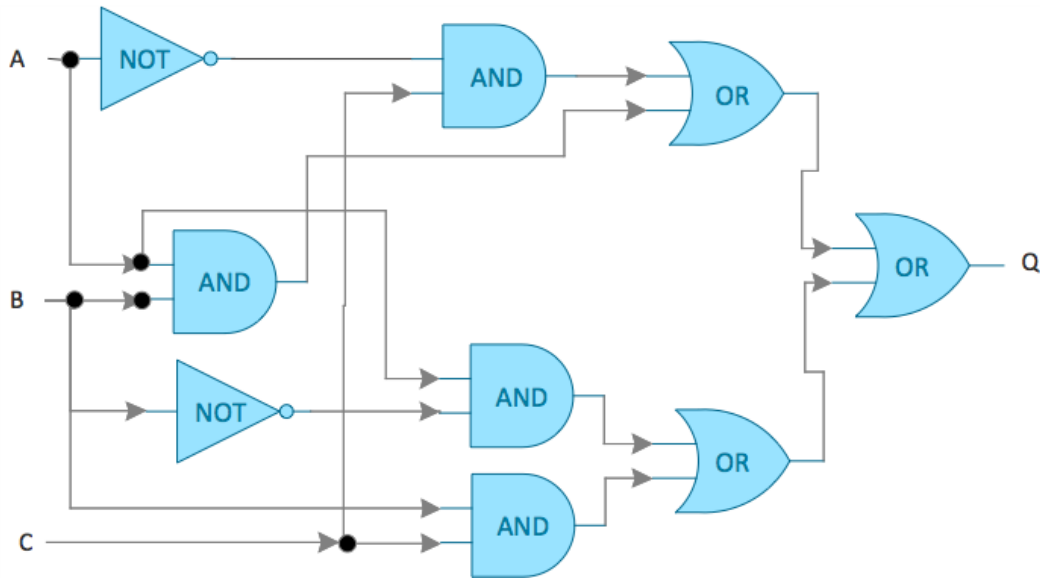

Figure 1

a. Give the Boolean function, f(A,B,C), for the output of the circuit given in figure 1.

Q = [($\overline{A}$C+AB)+AB]+[A$\overline{B}$+BC] = A$\overline{B}$ + BC

This can be reduced as shown in the next few steps.

b.   Generate a truth table for the output Q, given all possible values of the inputs A, B, C.

AB \ C	0	1
00	0	1
01	0	1
11	1	1
10	1	1

Q = A + C

c.   Given the Boolean function and truth table, determine if the Boolean function can be reduced. Show your work and if possible, give the reduced Boolean function.
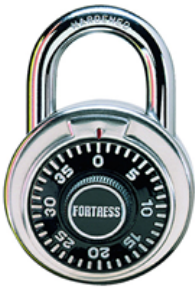
Q = A+C

4. Given two combination locks:

A.

B.

A. Which of any of the two locks would represent a function that is similar to a combinational circuit? Why?

Lock A could be considered a combinational circuit because given the correct input, all four numbers could be passed at once and would output the correct response (the lock would open).

Lock B, however, is not combinational, but there is no way to pass all of the input at once.

B. Which of any of the two locks would represent a function that is similar to a sequential circuit? Why?

Lock B represents a sequential circuit because all inputs are "passed" one at a time, sequentially.